Indicator: Waters Supporting Healthy Aquatic Biological Communities

Indicators/Measures
The percentage of river and stream miles, lake acres, Great Lakes acres and shoreline miles, and wetland acres meeting aquatic life use criteria and biocriteria targets is being used as a direct indicator of this goal.

Purpose
This indicator provides a direct measure of the health of aquatic biological communities. To best reflect the health of aquatic biological communities, assessments of fish communities, macroinveterbrates or other species are combined with measurements of water chemistry and habitat quality. This data, taken together with the areal extent of waters assessed, will provide a picture of the health of aquatic communities across the region.

Interpretation
An increase in the percentage of water miles and acres meeting aquatic life use criteria and biocriteria targets indicates a positive trend toward meeting the goal. Additionally, the percentage of water miles and acres assessed for aquatic life use is being tracked to provide context for the primary indicator. An increase in the areal extent of waters assessed will also be viewed as a positive trend in the Region.

Endpoint
Over time, EPA would like to see progress made in both the percentage of waters supporting healthy aquatic biological communities and the areal extent of waters assessed. Data from 2002 establish the baseline for this indicator (see Figures 1 and 2).

Discussion/Importance
An "aquatic biological community" is the collection of plants and animals – microorganisms, algae, invertebrates, fish and other living things — that inhabit a body of water. Some, such as the region's many species of sport fish, are highly prized by anglers. Others, like wild rice, are culturally important as traditional staple foods. Still others, such as the different species of algae, aquatic insects and forage fish, are important links in food webs (both aquatic and terrestrial). Disturbing or eliminating components of a food web can result in the loss of additional species. Taken as a whole, the plants and animals that live in our lakes, rivers and streams form the biological communities that we depend on for a multitude of uses, including food and recreation.

The Clean Water Act requires that states adopt water quality standards that include the need to maintain water quality at a level sufficient to sustain healthy biological communities. One of the most meaningful ways to determine if our waters meet this standard is to observe directly the communities of plants and animals that live in them. Because aquatic plants and animals are constantly exposed to the effects of various stressors – such as the presence of pollutants, alteration of habitat or introduction of exotic species – these communities reflect not only current conditions, but also problems that may be intermittent and the cumulative impacts of multiple stressors.

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An aquatic life use may be considered impaired if the aquatic community present at a site is significantly different from the expectations for the site (called a reference condition), or if the concentration of a particular pollutant or pollutants is higher than the established criterion. States in Region 5 use a combination of chemical, physical and direct biological measurements to determine whether or not waters are supporting healthy biological communities. For example, Minnesota uses information on fish communities, temperature, pH, turbidity, trace metals and others to determine whether or not the standard is achieved in rivers and streams. For lakes, Illinois uses a combination of trophic state status, macrophyte coverage and sediment impairment to determine impairment.

As a baseline, these data show us that about 50 percent of the assessed river and stream miles, 70 percent of the lake acres, 78 percent of the Great Lakes shoreline miles, and 99 percent of the 690 acres of wetlands assessed meet aquatic life use (see Figure 1). These data also show that many waters remain unassessed (see Figure 2). The areal extent of waters assessed and the percentage of those waters that support healthy aquatic biological communities also varies across water body types. For example, while most of the Great Lakes shore line miles are assessed, virtually no wetlands are. If we were to break down these water body types further - such as rivers and streams by size - we would probably see that various types of streams are also more likely to be monitored than others.

In the future we will track trends in the percentage of waters assessed and will try to illustrate trends in the percentage of waters with healthy aquatic biological communities. At this time, we are not able to directly track trends in the percentage of waters with healthy aquatic biological communities because data that are collected and reported for each biennial water quality report are not usually amenable to tracking this type of trend information. Region 5 and the states are working toward a more comprehensive assessment of waters that would allow such reporting to take place.

Data Source

State Clean Water Act Section 305(b) Water Quality Reports

Limitations

1. Currently, all states are not using the same methods and work needs to be done to determine how comparable the results are from the various methods.
2. It is important to remember that currently the percentage of waters meeting aquatic life uses cannot be extrapolated to all waters in Region 5.
3. Reporting the number of stream miles or lake acres assessed also does not provide a measure of the distribution of sampling sites across a state or region, which is also important for accurately assessing water quality on a state or regional scale. The design used may allow for extrapolation across a large region with a small number of sites (in the same manner voting surveys are conducted) or may call for much more intensive sampling in the area. Indiana's assessment is based on random sampling design that allows for a statistically accurate assessment of all waters within their major basins and at the statewide scale.

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Figure 1
Percent of Assessed Waters Meeting Aquatic Life Use - 2002

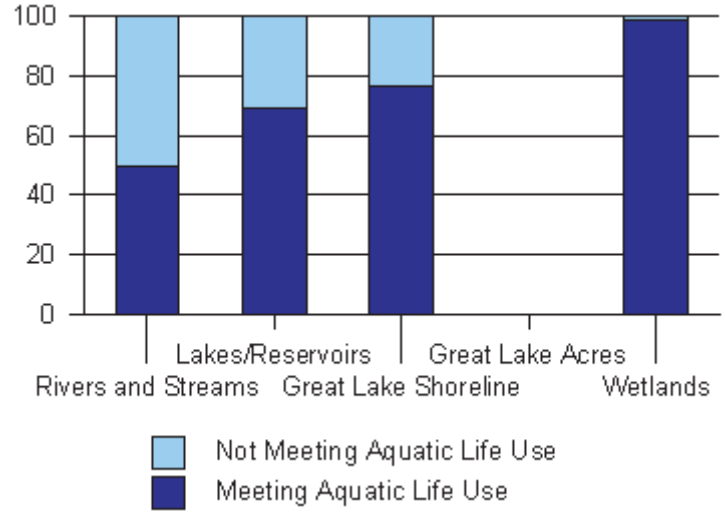
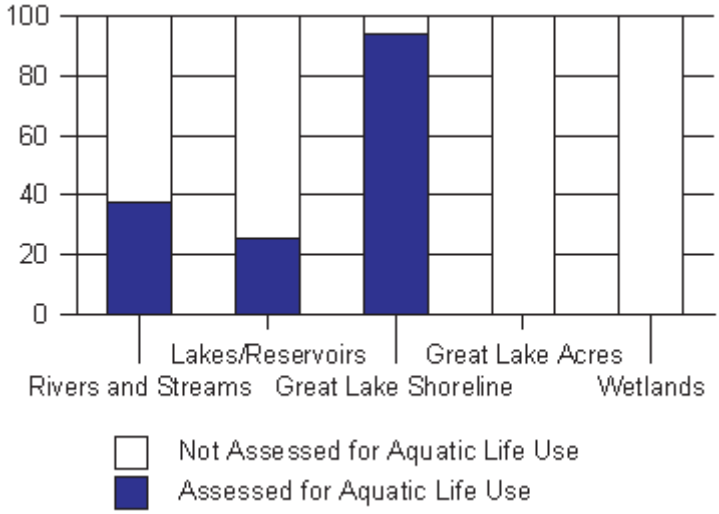


Figure 2
Percent of Waters Assessed for Aquatic Life Use - 2002



Definitions

- *Stressors:* Chemical, physical and biological factors that adversely affect aquatic organisms.
- *Reference Condition:* Set of selected measurements or conditions of unimpaired or minimally impaired water bodies characteristic of a water body type in a region.
- *Aquatic biological community:* The organisms living in or depending on the aquatic environment - usually an interacting group.
- *Trophic Status:* Available phosphate content and subsequent biological productivity; defines the degree of eutrophication (aging process by which a lake evolves into a bog or marsh and ultimately assumes a completely terrestrial state and disappears). This process can be sped up by human activities.

For More Information

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